

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GORDON ISRAELSON

Appeal No. 2004-1739
Application No. 09/669,784

HEARD: November 16, 2004

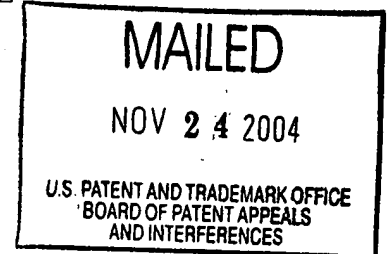
Before GARRIS, WARREN, and DELMENDO, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 (2004) from the examiner's final rejection of claims 1 through 20, which are all of the claims pending in the above-identified application.

The subject matter on appeal relates to a process to desulfurize sulfur containing fuel gas used as feed fuel for a fuel cell system. Further details of this appealed subject matter are recited in representative claims 1, 11, and 19, the



only independent claims on appeal, reproduced below:

1. A process to desulfurize sulfur containing fuel gas used as feed fuel for fuel cell system comprising the steps:

- (1) providing a main feed stream of sulfur containing fuel gas containing at least 0.30 ppm of odorous sulfur compounds; and then
- (2) passing part of that main feed stream of sulfur containing fuel gas and compressing it to a pressure over 304 kPa; and then
- (3) passing the compressed sulfur containing fuel gas to sulfur selective membrane, where the gas is separated into a sulfur concentrated stream, and a sulfur lean stream containing no more than 0.20 ppm of sulfur compounds; and then
- (4) passing the sulfur concentrated stream back to the main feed stream down stream from where the stream of step (2) was provided; and then
- (5) optionally measuring gas flow and reducing gas pressure; and then
- (6) passing the sulfur lean stream through a sulfur sorbent medium to collect sulfur, providing an essentially sulfur free stream containing no more than 0.10 ppm of sulfur compounds; and
- (7) optionally reforming the essentially sulfur free stream prior to passing it to contact a fuel cell.

11. A method of reducing the sulfur concentration in a sulfur containing fuel gas used as feed fuel for a fuel cell system, comprising:

providing a main fuel feed stream containing a sulfur containing fuel gas;

pressurizing at least a portion of the sulfur containing fuel gas;

passing at least a portion of the pressurized sulfur containing fuel gas through a sulfur selective membrane to separate the gas into a sulfur concentrated stream and a sulfur lean stream, the

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sulfur concentrated stream having a higher sulfur concentration than the sulfur lean stream;

passing the sulfur concentrated stream back into the main fuel feed stream downstream from where the sulfur containing fuel gas is pressurized; and

passing the sulfur lean stream through a sulfur sorbent medium to reduce the sulfur concentration in the sulfur lean stream.

19. A method of reducing the sulfur concentration in a sulfur containing fuel gas used as feed fuel for a fuel cell system, comprising:

providing a main fuel feed stream containing a sulfur containing fuel gas;

passing at least a portion of the sulfur containing fuel gas through a sulfur selective membrane to separate the gas into a sulfur concentrated stream and a sulfur lean stream, the sulfur concentrated stream having a higher sulfur concentration than the sulfur lean stream;

passing the sulfur concentrated stream back into the main fuel feed stream such that the sulfur concentrated stream does not mix with the sulfur lean stream; and

passing the sulfur lean stream through a sulfur sorbent medium to reduce the sulfur concentration in the sulfur lean stream for use as the feed fuel for the fuel cell system.

The examiner relies on the following prior art references as evidence of unpatentability:

Preston, Jr. (Preston)	4,202,865	May 13, 1980
Carnell et al. (Carnell)	4,978,439	Dec. 18, 1990
Willis (published GB application)	GB 2 289 286 A	Nov. 15, 1995

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Claims 1 through 3 and 5 through 20 on appeal stand rejected under 35 U.S.C. § 103(a) as unpatentable over Willis in view of Preston. (Examiner's answer mailed Nov. 27, 2000, paper 14, pages 3-5.) In addition, claim 4 on appeal stands rejected under 35 U.S.C. § 103(a) as unpatentable over Willis and Preston, as applied to claims 1 through 3 and 5 through 20, further in view of Carnell. (Id. at 5.)

We reverse these rejections.

A principal issue in this appeal is whether the combined teachings of the prior art references would have led, prima facie, one of ordinary skill in the art to pass "the sulfur concentrated stream [of Willis] back into the main fuel feed stream..." as recited in the independent claims on appeal. (Appeal brief filed Sep. 26, 2002, paper 13, pages 3-4; reply brief filed Jan. 24, 2003, paper 15, pages 1-4; answer at 6.) We agree with the appellant that the examiner's position as to this claim limitation is not well founded.

Willis teaches a process for decreasing sulfur content of a raw gas stream containing hydrogen sulfide (and possibly other sulfur compounds) comprising:

subjecting the gas stream to a membrane separation step to divide said raw gas stream into a minor permeate stream having

an increased hydrogen sulfide content and a major impermeate stream having a decreased hydrogen sulfide content;

subjecting the minor permeate stream to treatment with a regenerable liquid to reduce the hydrogen sulfide content of said minor permeate stream (e.g., by absorption of hydrogen sulfide and/or conversion thereof to elemental sulfur) to form a first, minor product stream having a hydrogen sulfide content below said increased hydrogen sulfide content;

subjecting the major impermeate stream to treatment with a non-regenerable solid that absorbs hydrogen sulfide to give a second, major, product stream having a hydrogen sulfide content below that of said impermeate stream; and then

combining the first and second product streams. (Page 1, line 27 to page 2, line 2.)

In contrast to the subject matter recited in the independent claims on appeal, Willis does not disclose the specified step of "passing the sulfur concentrated stream back into the main fuel feed stream..." Regarding this claim limitation, the examiner argues that "[t]he limitation encompasses feeding the sulfur-rich stream in alternate locations, as indicated in the marked-up copy of Figure 1 [attached to the answer]." (Answer at 6.) As pointed out by

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the appellant, however, the claims on appeal do not encompass or read on the examiner's proposed process as indicated in the marked-up copy of Figure 1. The examiner identifies no teaching or suggestion in Willis, or any of the other relied upon prior art references, that would have led one of ordinary skill in the art to pass "the sulfur concentrated stream back [of Willis] into the main fuel feed stream..."

It is our judgment, therefore, that the examiner has not made out a prima facie case of obviousness against the appealed claims within the meaning of 35 U.S.C. § 103(a). In re Piasecki, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984).


In sum, we reverse the examiner's rejections under 35 U.S.C. § 103(a) of: (i) claims 1 through 3 and 5 through 20 as unpatentable over Willis in view of Preston; and (ii) claim 4 as unpatentable over Willis and Preston, as applied to claims 1 through 3 and 5 through 20, further in view of Carnell.

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The decision of the examiner is reversed.

REVERSED

Bradley R. Garris
Administrative Patent Judge


Charles F. Warren
Administrative Patent Judge

BOARD OF PATENT

APPEALS AND

INTERFERENCES


Romulo H. Delmendo
Administrative Patent Judge

rhd/

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